

# A Study on the Teaching Reform of "Building Construction" Course of Architecture Major in Universities Based on Industry Norms

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**ABSTRACT** "Building Construction" course is an indispensable basic course and technical course in the undergraduate education system of architecture major. Its content is closely related to changes in national industry norms and atlases, so the teaching content should follow the development of the construction industry and society changes and updates. However, there are many problems in the textbooks of "Building Construction" currently used in colleges and universities compared with the construction industry code. Therefore, the teaching of the course of "Building Construction" should be reformed in combination with the latest regulations of the construction industry and the training of high-quality "new-type dual-structural teachers".

## 1. INTRODUCTION

Formal verification can reveal the unexposed defects in China's socio-economic development, and put forward higher expectations and requirements for the development of the construction industry. The rapid development and application of scientific and technological information such as new materials and technologies has brought new and inevitable technological reforms to the construction industry. This also puts forward wider requirements for the quality of talents for architecture majors in universities. College architecture major mainly trains professionals with certain practical ability and application ability, and its teaching methods mostly adopt practical cases such as study, design and practice to emphasize practical application and skills training. This requires that the teaching content and teaching methods of architecture majors be continuously improved with the progress of society. As many as 149 national professional codes of construction have been updated and updated in just one year in 2019. In addition to the changes and updates of the national standard atlas and provincial codes, regulations, and atlases, the changes and updates of the amount of knowledge in the construction industry are very huge. Therefore, it is difficult to meet the requirements of social development for the quality of talents in the training of architecture professionals in universities. "Building Construction" course is an indispensable basic course and technical course in the undergraduate education system of architecture. Its content is closely related to changes in national industry norms and atlases. Therefore, the teaching content should be constantly changed and updated following the development of the construction industry and society.

## 2. RESEARCH PURPOSES AND METHODS

In order to understand the teaching content of the current course of "Building Construction" for architecture majors, three major "Building Construction" textbooks used by domestic college architecture majors are selected to organize the main construction industry normative content (the following textbooks 1<sup>[1]</sup>, textbooks 2<sup>[2]</sup>, and textbooks 3<sup>[3]</sup> naming), and make a comparative analysis with the latest regulations of the national construction industry, and put forward constructive suggestions for the teaching reform of the course of "Building Construction" of the college architecture specialty.

Table 1 Selected "Building Construction" Textbooks

Serial number	Textbook name	Editor in chief	Publishing house	Edition	Remark
1	Building Construction (volume One)	BiYu Li、Hongyang Wei、Lin Tan	China Construction Industry Press	March 2019	Planning materials
2	Building Construction (volume One)	Gang Pei、Yanhua An	Huazhong University of Science and Technology Press	March 2019	Planning materials
3	Building Construction	Xuexian Liu	Machinery Industry Press	March 2014	No latest version

Table 2 Selected major commonly used new edition specifications

Serial number	Canonical name	Edition
1	Code for fire protection design of buildings GB50016-2014	2018 year
2	Uniform standard for design of civil buildings GB50352-2019	2019 year
3	Code for seismic design of buildings GB50011-2010	2016 year
4	Technical code for roof engineering GB 50345-2012	2012 year

### 3. Reform of Teaching Content of “ Building Construction ” Course

#### 3.1. Classification of Buildings-Comparison with “ Code for fire protection design of buildings ”

Many of the basic courses and elective courses offered by the architecture major serve the architectural design course, and the " Building Construction " course is no exception. It is important to determine the classification of buildings in architectural design, especially the division of single, multi-storey civil buildings and high-rise civil buildings (divided into first-class high-rise and second-class high-rise) according to the height and number of floors. The incorrect division of this part of the building specialty will directly lead to the wrong choice of construction methods such as the fire resistance rating and the waterproof rating of the building roof, as well as successive errors in the majors such as structure, water supply and drainage, HVAC, and electrical, and affect the safety of the entire building. coefficient. The classification method is clearly defined in the 2018 edition of the " Code for fire protection design of buildings ", but the three selected textbooks all have defects to varying degrees. Textbook 1<sup>[1]</sup> refers to the latest version, but the distinction between Class I high-rise buildings and Class II high-rise buildings is not detailed enough. Textbooks 2<sup>[2]</sup> and 3<sup>[3]</sup> refer to the 2006 version of the code. In 2006, textbook 3 even made two errors. version.

Table 3 Comparison of building classification and " Code for fire protection design of buildings "

Textbook classification	Problem	Edition	Analysis results
Textbook 1	Missing content	2018 edition	Need to add content
Textbook 2	Canonical reference error, missing content	2016 edition	Need to be corrected
Textbook 3	Canonical reference error, missing content	2006 edition, 2010 edition	Need to be corrected

#### 3.2. Wall Construction-Comparison with “Code for seismic design of buildings”

The seismic design in the construction drawing design is mainly completed by the structural profession, but the seismic design content also plays an important role in the architectural professional scheme design, such as the fortification intensity and the limit of the number of floors, total height, and local size of the multi-storey masonry house The value and the width of the seismic joints have a great impact on the building design. These contents directly affect the feasibility of the realization of architectural modeling design and architectural scheme design. The contents of the

2016 edition of the " Code for seismic design of buildings " are comprehensive, but none of the three selected textbooks are comprehensive.

Table 4 Comparison of wall structure and "Code for Seismic Design of Buildings"

Textbook classification	Problem	Edition	Analysis results
Textbook 1	Missing content	2010 edition	Need to add content
Textbook 2	Missing content	2010 edition	Need to add content
Textbook 3	Missing content	2010 edition	Need to add content

### 3.3. Stair Construction-Comparison with "Uniform standard for design of civil buildings"

The staircase is the main facility for the organization of vertical traffic and the safe evacuation of people in the building, and it plays an important role in the interior space and the safety of the building. In terms of the scale of the stairs, the buildings used by vulnerable groups such as nurseries, kindergartens, and elderly buildings have different requirements. The 2019 edition of the " Uniform standard for design of civil buildings " has detailed contents, but all three selected textbooks contain Something is missing or wrong.

Table 5 Comparison of Stair Structure and " Uniform standard for design of civil buildings "

Textbook classification	Problem	Edition	Analysis results
Textbook 1	Canonical reference error, missing content	2005 edition	Needs corrections and additions
Textbook 2	Canonical reference error, missing content	2005 edition	Needs corrections and additions
Textbook 3	Canonical reference error, missing content	2005 edition	Needs corrections and additions

### 3.4. Roof Construction-Comparison with "Technical code for roof engineering "

The roof is both the topmost envelope structure and the load-bearing structure of the building, and it plays a very important role in building modeling. As the topmost building envelope, the main problem to be solved from the perspective of construction should be the drainage and drainage of the roof. The correct selection of the waterproof level, structural level and cornice structure of the roof will directly affect the waterproof and drainage of the building and its use. In this regard, Textbook 1<sup>[1]</sup> refers to the latest specifications, and the content is accurate and comprehensive; Textbooks 2<sup>[2]</sup> and 3<sup>[3]</sup> refer to the 2004 version of the specification, causing content errors.

Table 6 Comparison of roof structure and " Technical code for roof engineering "

Textbook classification	Problem	Edition	Analysis results
Textbook 1	no	2012 edition	qualified
Textbook 2	Specification reference error, content error	2004 edition	Need to be corrected
Textbook 3	Specification reference error, content error	2004 edition	Need to be corrected

### 3.5. Summary

From the above comparison, we can see that there is a big problem in the current textbook of "Building Construction" compared with the industry code. This is still a comparison with the main contents of several commonly used latest codes and textbooks. If detailed and comprehensive comparisons are made with all the latest version codes of the architecture major, the problem will be more serious. Especially the selected teaching materials 2<sup>[2]</sup> and 3<sup>[3]</sup> have serious problems and need to be further optimized. This requires that the content of the course "Building construction" should be supplemented and improved following the changes and updates of the national construction industry code.

#### **4. Reform of the Faculty of “Building Construction”**

The content of the textbook “Building Construction” is difficult to keep up with the changes and updates of national construction industry codes. This is a real problem in the current textbook of “Building Construction”, and it is also a difficult problem for teachers who have long focused on the front-line teaching of “Building Construction”. “Building Construction” course is a very practical building technology course. There are two main requirements for teachers. One is to keep up with the development speed of the construction industry, and the other is to have practical experience. Therefore, the emphasis of the teaching reform on the course of “Building Construction” should focus on the construction of the teaching staff and the application of the “school-enterprise cooperation” model focusing on the training of “double-teacher structure teachers”.

##### **4.1. Training of “Double Teacher Structure Teachers”**

At present, there are many full-time teachers who have rich practical experience and are qualified as national first-class registered architects. These teachers have a high qualification and technical level in the construction industry, and generally work part-time in the architectural design institute. Designing or reviewing drawings, these personnel are not only clear about changes and updates of national construction industry codes, but also very knowledgeable in building construction. With these teachers as the mainstay, it is very beneficial to set up a course group of “Building Construction” and train young “double-teacher structure teachers”. For example, under the premise of studying industry norms, textbooks and outlines, the course team conducts collective preparation, lectures, homework management, judging papers, analysis, and summary to cultivate high-quality “new-type dual-structural teachers”.

##### **4.2. Application of “School-Enterprise Cooperation” Model**

The “Building Construction” curriculum is highly practical and the content is updated quickly, which determines the necessity of combining the “Building Construction” curriculum with the “school-enterprise cooperation” model. Architectural design enterprises are the departments that use the most frequent changes and updates to the national construction industry codes, and are the departments that have the most thorough understanding of the principles of building construction. The use of the “school-enterprise cooperation” platform to achieve the purpose of “invite in and send out” is very beneficial to the construction of “Building Construction” courses. On the one hand, we hire senior architects from off-campus practice bases with high theoretical literacy to include them in the “Building Construction” curriculum group to study the curriculum together. Forms are sent to off-campus practice bases for practical skills training.

#### **5. Concluding remarks**

Through a comparative analysis of the teaching materials of the “Building Construction” course and the latest regulations of the national construction industry, it was found that the contents of the teaching materials could not keep up with the changes and updates of the construction industry specifications. Therefore, the teaching of “Building Construction” should be reformed in the following aspects. (1) Carefully study the latest national construction industry specifications related to the teaching content, and integrate and modify them with the textbook content; (2) Combined with the needs of architectural design courses, appropriately reduce or increase the content of the construction industry code; (3) Establish “Building Construction” course group and “school-enterprise cooperation” and other models to cultivate high-quality “new-type dual-teacher structure teachers” who understand the latest specifications of the construction industry and have certain practical experience.

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